voltage probe detectably emitting infrared radiation for probing instantaneous high-speed fluctuations of the local supply voltage in the integrated circuit, the radiation having an intensity that is related to a magnitude of the local supply voltage. It is submitted that Kash '022 (and also the reference Kash '545, which it incorporates) does not disclose each of the elements of claim 1 for the reasons that: a) it does not disclose a voltage probe incorporated in a VLSI circuit; b) it does not disclose a voltage probe that detectably emits infrared radiation; and c) it does not disclose an apparatus that probes instantaneous high-speed fluctuations of the local supply voltage.

Kash '022 concerns a method and system for reverse engineering an integrated circuit in which a circuit tester is used to exercise a circuit under test and a PICA imaging system is used to detect light emitted from the circuit under test. Kash '022, Abstract. Kash '022 only mentions or refers to "light" or "optical" emissions. See e.g., Kash '022, col. 3, line 33. These terms indicate the use of the visible spectrum for detection as opposed to infrared emissions, which are not normally referred to as "optical" emissions. In fact, neither Kash '022 nor Kash '545 mention or refer in any way to the use of infrared radiation. This omission is significant because of the relationship between **infrared** radiation intensity and local supply voltage discussed in the present invention which does not necessarily hold for emissions in the visible spectrum. See specification, page 5, lines 26 to page 6, line 4. Thus, visible emissions cannot be used in the same manner to probe local supply voltage variation.

Secondly, neither Kash '022 nor Kash '545 disclose a voltage probe that is incorporated in a VLSI circuit. Kash '022 does not refer to use of a probe at all, but rather, merely refers to using a PICA detector to detect data directly from "all of the devices in a circuit." Kash '022, col. 3, lines 66-67. Kash '545 discloses use of an "optical sampling probe (4) placed in proximity to the device under test." But this optical sampling probe turns out to be an optical fiber placed in "an image plane of the microscope 2 so as to receive light from a single portion of the circuit." See Kash '545, col. 4, lines 17-19; Figure 1. Since this optical fiber is demonstrably not incorporated in the circuit under test, it is clear that the only probe referred to in either of the Kash references is in no way equivalent to a voltage probe that is incorporated in a VLSI circuit.

Furthermore, since the Kash references do not disclose or refer to a probe incorporated in a VLSI circuit, *a fortiori*, they do not disclose a probe that is coupled to

a local voltage supply. Consequently, the Kash references do not disclose or suggest a probe that is able to detect either the magnitude or variation of the local supply voltage.

Kash '022 describes "using a PICA system to monitor time and space information of patterns of light emissions from devices in circuits in an IC chip [over time] under test can yield reliable and efficient mapping out of such devices and circuit." Kash '022, col. 3, lines 12-15. It is further stated that:

> "By sampling at periodic time intervals, the reverse engineering system would time order the patterns of optical emission being collected by the PICA system, This provides a set of patterns that can be compared against known reference patterns for known devices, etc., to assist in reconstructing a circuit model of devices in a circuit in an IC Chip."

Kash '022, col. 3, lines 36-42; emphasis added.

It is clear that what is being disclosed here is a method of pattern determination, whereby the light patterns detected from the IC are used to identify the components and devices in the IC based on their light emission "signature". Whatever valuable information may be determined in this manner, the technique disclosed in Kash '022 does not provide for detection of local supply voltage variation as claimed, using a probe incorporated in the VLSI circuit of interest and coupled to the local supply voltage.

As to the assertion on page 3 of the Office Action, that Kash '022 discloses a MOSFET (304) that emits infrared radiation and is coupled to the local supply voltage, Applicants are puzzled since the component (304) is a ROM unit from which stored static values are read out. The reference makes clear that it determines the stored values by monitoring transitions (between one and zero, or zero and one) at the readout buffer relative to a known time base. It is unclear how this ROM can constitute a probe for local supply voltage, which can vary continuously in an analog rather than digital fashion. Thus, while an integrated circuit tested in Kash '022 may include one or more MOSFET devices, there is no disclosure of such MOSFETs being used to probe local supply voltage.

For at least these reasons, it is respectfully submitted that the Kash references ('022 and '545) clearly do not disclose all of the features of independent claim 1, which is therefore patentable over these references. As claims 2 and 3 depend from and further limit claim 1, they are also patentable over the Kash references.

As independent claim 4 recites an apparatus that includes a MOSFET device that detectably emits infrared radiation for probing instantaneous high-speed fluctuations of the local supply voltage in an integrated circuit, claim 4, and claims 5-8, which depend from claim 4, are also patentable over the Kash references.

Independent claim 9 recites an apparatus that includes a decoupling capacitor incorporated in a VLSI circuit and coupled to a source of the local supply voltage which detectably emits infrared radiation for probing instantaneous high-speed fluctuations of a local supply voltage in an integrated circuit. As discussed above with respect to claim 1, the Kash references do not disclose any device incorporated in a VLSI that is coupled to a source of the local supply voltage and detectably emits infrared radiation for probing instantaneous high-speed fluctuations of a local supply voltage in the integrated circuit, let alone a decoupling capacitor. Therefore, claim 9, and claim 10 which depends from claim 9, are also patentable over the Kash references.

As independent claim 11 recites a method for probing instantaneous high-speed fluctuations of a local supply voltage which comprises, *inter alia*, emitting infrared radiation using a local voltage probe, and determining local supply voltage fluctuation as a function of the sampled emitted radiation intensity, it is patentable over the Kash references for at least the same reasons as claim 1, as are its dependent claims 12-18.

CONCLUSION

All issues having been addressed, it is believed that the present application is in condition for allowance. Prompt reconsideration and allowance of the present application are respectfully requested.

Respectfully submitted,

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